INDIANA DEPARTMENT OF TRANSPORTATION

Driving Indiana's Economic Growth

Memorandum

February 23, 2009

CONSTRUCTION MEMORANDUM
09-06

TO: District Deputy Commissioners
Technical Services Directors
District Construction Engineers
District Testing Engineers
District Area Engineers
Project Engineers/Supervisors

FROM: Mark A. Miller, Director
Division of Construction Management

SUBJECT: PCCP Cost Savings Measures

Revisions to the 500 Section of the Standard Specifications were approved by the Standards Committee at its November 2008 meeting. Implementation of these revisions should result in cost savings for the Department. Recurring Special Provision 500-R-559, Concrete Pavement, incorporates these changes and will be placed in contracts beginning with lettings on or after February 1, 2009. INDOT and industry have also agreed on a method to implement the revised specification on active contracts.

One of the changes included in the revised specification is a modification of the trial batch procedure. Sections 501 and 506 have been modified to eliminate the need for a trial batch in some situations. When applicable, the elimination of these trial batches will reduce the workload for District Construction and Testing personnel and will save time for both District Construction and the contractor on the affected contracts. The first attachment to this memo is the specification which describes the modified trial batch process. A zero dollar change order with this attachment should be processed immediately to modify all active contracts with 501 and 506 pay items to incorporate this revised specification.

A second change applies to 501 and may be incorporated in active contracts via change order. It is a revision to 501.05 and reduces the minimum portland cement content from 440 lb/yd^3 (260 kg/m^3) to 400 lb/yd^3 (240 kg/m^3).

District Construction should talk with contractors on active contracts to determine if the contractor is interested in adding the specification regarding the minimum portland cement content to the contract via change order. The contractor is not required to incorporate the revised specification and if the contractor

declines, the contract will continue to be performed in accordance with the specifications currently in effect for that contract.

INDOT and industry have agreed on a standard credit for various QC/QA PCCP pay items if the contractor elects to incorporate the reduced portland cement content revision. The credits for implementation of this specification revision are as shown below:

Pay Item	Required Credit
QC/QA PCCP, 10 in (250 mm)	\$0.22/syd (\$0.26/m^2)
QC/QA PCCP, 11 in (275 mm)	\$0.24/syd (\$0.29/m^2)
QC/QA PCCP, 12 in (300 mm)	\$0.27/syd (\$0.32/m^2)
QC/QA PCCP, 13 in (325 mm)	\$0.29/syd (\$0.34/m^2)
QC/QA PCCP, 14 in (350 mm)	\$0.31/syd (\$0.37/m^2)
QC/QA PCCP, 15 in (375 mm)	\$0.33/syd (\$0.39/m^2)
QC/QA PCCP, 16 in (400 mm)	\$0.36/syd (\$0.42/m^2)

For pavement thicknesses not included in the table above, the credit should be calculated by the using one of the following formulas:

- English Contracts—Credit (per syd) = (\$0.80) * t / 36, where t is pavement thickness (in)
- Metric Contracts—Credit (per m^2) = (\$1.05) * t / 1000, where t is pavement thickness (mm)

If the contractor agrees to the specification revision in exchange for the above tabulated credit, the agreement shall apply to all QC/QA PCCP pay items in the contract. Upon reaching such an agreement with the contractor, the PE/PS should prepare a change order to execute the specification change and associated credit and utilize the second attachment to this memo as an attachment to the change order. The change order should delete the estimated remaining quantity for all existing QC/QA PCCP pay items from the contract. New pay items with the same estimated quantity should then be created. The new pay items must use the same pay item description as the original contract pay item and must include a supplemental description of "2009 Concrete Pavement".

If there are any questions regarding this memo, please contact the Division of Construction Management Field Engineer for your District.

Attachment

MAM/jgj

REVISED TRIAL BATCH REQUIREMENTS

The Standard Specifications are revised as follows:

SECTION 501, BEGIN LINE 53, DELETE AND INSERT AS FOLLOWS:

~~The CMDS is used to conduct a trial batch in accordance with 501.06. Upon completion of the trial batch, the Contractor shall document the adjustments to the CMDS and submit the concrete mix design trial, CMDT, to the DMTE for approval. The CMDT shall be submitted a minimum of three work days prior to production to the DMTE utilizing the Department furnished spreadsheet. Production shall not commence without an approved CMDT. Both the Contractor's and the Engineer's tests will be included in the CMDT submittal.~~

~~The CMDT is used to start production. The CMDT can be adjusted in accordance with 501.17 and will be documented as a concrete mix design for production, CMDP. The CMDP shall be submitted by the end of the second lot to the DMTE utilizing the Department's spreadsheet. Production shall stop upon the end of the first sublot of the third lot if the CMDP is not received by the DMTE.~~

~~**(a) Change in Materials**~~

~~A change in a CMDP to any of the following requires a new CMDS.~~

~~1. cement source, except for type I~~
~~2. cement types for IA, IIIA, ISA, IP-A, IS, II, III, IP, ISM~~
~~3. admixture type~~
~~4. pozzolan source or type~~
~~5. aggregate material~~

~~**(b) Change in Source**~~

~~A change in a CMDP to any of the following requires a new CMDT.~~

~~1. cement source, type~~
~~2. admixture source utilizing the same type~~
~~3. aggregate source~~

~~When changes in the CMDP are in accordance with 501.04(b), the new CMDT shall be verified on the first sublot of production in accordance with 501.06, except the DMTE will use the acceptance test results for verification. The CMDT will be documented as a CMDP after verification. Production may continue until flexural strength tests are completed as long as all other properties are in accordance with 501.05. If the flexural strength is not in accordance with 501.05, production shall stop. All PCCP constructed with the new CMDT will be adjudicated as a failed material in accordance with normal Department practice in accordance with 105.03. No CMDT adjustments in accordance with 501.17 will be allowed. The CMDP shall be submitted to the DMTE utilizing the Department furnished spreadsheet by the end of the second lot. Production shall stop upon the end of the first sublot of the third lot if the CMDP is not received by the DMTE.~~

~~A CMDP from a previous contract may be submitted for use on additional contracts.~~

The CMDS is used to conduct a trial batch in accordance with 501.06. Upon completion of the trial batch, the Contractor shall submit the concrete mix design for production, CMDP. The CMDP shall be submitted to the DTE utilizing the Department furnished spreadsheet a minimum of three work

days prior to production. Production shall not commence without an approved CMDP. Both the Contractor's and Engineer's test results from the trial batch will be included in the CMDP submittal.

A CMDP may be changed or adjusted in accordance with the following:

(a) Change in Materials

A change in a previously approved CMDP, for a given contract, to any of the following shall be submitted to the DTE as a CMDS, referencing the original CMDP.

1. *cement source or type*
2. *pozzolan source or type*
3. *coarse aggregate source or type*
4. *admixture type*

A trial batch shall be conducted in accordance with 501.06, or verification of the new CMDS may be made during the first day of production by tests conducted by the Contractor and the Engineer. Acceptance test results may be used for the Engineer's verification tests. Production may continue until flexural strength tests are completed, provided all other properties are in accordance with 501.06. The test results shall be submitted to the DTE utilizing the Department spreadsheet no later than one day after the flexural strength test results are complete. If the flexural strength is not in accordance with 501.06, production shall stop and all PCCP constructed with the new CMDS will be adjudicated as a failed material in accordance with normal Department practice as listed in 105.03.

(b) Adjustments to Materials

An adjustment in a previously approved CMDP, for a given contract, to any of the following shall be submitted to the DTE as a CMDS, referencing the original CMDP.

1. *admixture source*
2. *admixture product of the same type and from the same source designated in the original CMDP*
3. *fine aggregate source*
4. *target unit weight due to change in aggregate properties*
5. *fine to total aggregate ratio in excess of ± 3 % from the value designated by the original CMDP*
6. *increase in cement content from the amount designated in the original CMDP*

The new CMDS shall be submitted to the DTE utilizing the Department spreadsheet a minimum of one work day prior to production. A trial batch or verification testing is not required for approval. Production shall not commence without an approved CMDP.

(c) Other Adjustments

Other adjustments in an approved CMDP, for a given contract, to any of the following will be permitted and DTE notification and approval prior to use is not required.

1. *admixture dosage rate*
2. *fine aggregate to total aggregate ratio within ± 3 % of the value designated by the original CMDP*

An approved CMDP from a previous contract may be used on additional contracts. The CMDP shall be submitted to the DTE for review and approval prior to use.

SECTION 501, BEGIN LINE 141, DELETE AND INSERT AS FOLLOWS:

501.06 Trial Batch

A trial batch shall be produced and tested by the Contractor's certified technician to verify that the CMDS ~~or CMDT~~ meets the concrete mix criteria. *Concrete produced at a plant* ~~The concrete~~ shall be batched within the proportioning tolerances of 508.02(b). *Concrete batched in a laboratory shall be in accordance with ASTM C 192.* The Engineer will test the trial batch and provide the Contractor with the results. The trial batch shall be of sufficient quantity to allow the Contractor and the Engineer to perform all required tests from the same batch. Trial batch concrete shall not be used for more than one test, except the concrete used for the unit weight (mass) may be used to conduct the air content test. *The air content shall be 5.0% to 10.0%. The plastic unit weight (mass) shall be within ± 3.0% from the target plastic unit weight of the CMDS. The water/cementitious ratio shall be within ± 0.030 of the target value of the CMDS and shall not exceed 0.450. The flexural strength shall be determined by averaging a minimum of two beam breaks and shall be a minimum of 570 psi (4000 kPa).*

~~The target unit weight (mass) and water/cementitious ratio of the plastic concrete shall be determined by the trial batch. The flexural strength shall be determined by averaging a minimum of two beam breaks.~~

Test results shall be added to the *Department spreadsheet* ~~CMDS or CMDT~~ and submitted to the D~~M~~TE in accordance with 501.04. *Adjustments to the target unit weight (mass) and the target water/cementitious ratio may be made.*

A trial batch is not required for a CMDS that has any of the following criteria:

(a) mimimum cement content of 564 lbs/yd^3 (335 kg/m^3) and a target water/cementitious ratio of 0.420
(b) class C concrete in accordance with 702 using Class AP coarse aggregate

SECTION 501, BEGIN LINE 165, DELETE AND INSERT AS FOLLOWS:

Lots and sublots will be *numbered and* tested ~~on the CMD's~~ for a given pay item~~. Lots and sublots~~ *regardless of the number of CMD's used and* will be closed out at the end of the paving season *or construction phase.*

SECTION 501, LINE 180, DELETE AND INSERT AS FOLLOWS:

Test or Determination	Frequency	Test Method	Precision
7-Day Flexural Strength	Two beams per sublot	AASHTO T 97	1 psi (10 kPa)
Air Content	One per sublot	AASHTO T 152 or ASTM C 173	0.1
Unit Weight	One per sublot	AASHTO T 121	1
Water/Cementitious Ratio	One~~e~~ per *two lots* ~~week~~	ITM 403	0.001
Thickness	Two per sublot	ITM 404	0.1

SECTION 501, BEGIN LINE 290, DELETE AS FOLLOWS:

501.17 ~~CMDT Adjustments~~ *Blank*

~~The target water/cementitious ratio and target unit weight may be adjusted during the first lot of each year's production or as a result of fluctuations in fine or coarse aggregate specific gravities.~~

~~Adjustments to the dosage amount of admixtures will be permitted; however, a new CMDS will be required for the addition or deletion of an admixture.~~

~~The fine aggregate to total aggregate ratio may be adjusted by ±3% within the limits of 501.05.~~

SECTION 506, BEGIN LINE 44, DELETE AND INSERT AS FOLLOWS:

~~The CMDS is used to conduct a trial batch in accordance with 506.05. Upon completion of the trial batch, the Contractor shall submit results of the concrete mix design trial to the DMTE for approval a minimum of three work days prior to production utilizing the Department provided spreadsheet. The DMTE will approve the submission as a CMDP, and production may commence. Both the Contractor's and the Engineer's tests will be included in the CMDS submittal.~~

~~**(a) Change in Material**~~

~~A change in a CMDP to any of the following requires a new CMDS.~~

~~1. cement type~~
~~2. admixture type~~
~~3. aggregate material~~

~~**(b) Change in Source**~~

~~A change in a CMDP to any of the following requires a new CMDS.~~

~~1. cement source~~
~~2. admixture source~~
~~3. aggregate source~~

~~Verification of the new CMDS will be conducted during production including sampling and testing within the first 10 cyd (8 m^3), for the following.~~

~~1. cement source, type I only~~
~~2. admixture source, air entraining admixtures only~~

~~A new CMDP will be issued upon approval of test verification by the DMTE.~~

~~**(c) Change in Mixture**~~

~~A change in a CMDP to any of the following requires a new CMDS.~~

~~1. proportions of aggregates by weight (mass) exceeding ± 2%~~
~~2. addition or deletion of an admixture~~

~~A CMDP in accordance with 506.04 in the current or previous calendar year may be substituted for use upon the approval of the DMTE.~~

The CMDS is used to conduct a trial batch in accordance with 506.05. Upon completion of the trail batch, the Contractor shall submit the concrete mix design for production, CMDP. The CMDP shall be submitted to the DTE utilizing the Department furnished spreadsheet a minimum of three work days prior to production. Production shall not commence without an approved CMDP. Both the Contractor's and Engineer's test results from the trial batch will be included in the CMDP submittal.

A CMDP may be changed or adjusted in accordance with the following:

(a) Change in Materials

A change in a previously approved CMDP, for a given contract, to any of the following shall be submitted to the DTE as a CMDS, referencing the original CMDP.

1. *cement source or type*
2. *pozzolan source or type*
3. *coarse aggregate source or type*
4. *admixture type(s)*

A trial batch shall be conducted in accordance with 506.05, or verification of the new CMDS may be made during the first day of production by tests conducted by the Contractor and the Engineer. Production may continue until flexural strength tests are completed, provided all other properties are in accordance with 506.04. The test results shall be submitted to the DTE utilizing the Department spreadsheet no later than one day after the flexural strength test results are complete. If the flexural strength is not in accordance with 506.04, production shall stop and all PCCP patching constructed with the new CMDS will be adjudicated as a failed material in accordance with normal Department practice as listed in 105.03.

(b) Adjustments to Materials

An adjustment in a previously approved CMDP, for a given contract, to any of the following shall be submitted to the DTE as a CMDS, referencing the original CMDP.

1. *admixture source*
2. *admixture product of same type and from same source designated in the original CMDP*
3. *fine aggregate source*
4. *fine to total aggregate ratio in excess of ± 3 % from the value designated by the original CMDP*
5. *Increase in cement content from amount designated in the original CMDP.*

The new CMDS shall be submitted to the DTE utilizing the Department spreadsheet a minimum of one work day prior to production. A trial batch or verification testing is not required for approval. Production shall not commence without an approved CMDP.

(c) Other Adjustments

Other adjustments in previously approved CMDP, for a given contract, to any of the following will be permitted and DTE notification and approval prior to use is not required.

1. *admixture dosage rate*
2. *fine aggregate to total aggregate ratio within ± 3 % of the value designated by the original CMDP*

An approved CMDP, from another contract in the current or previous calendar year may be used on additional contracts. The CMDP shall be submitted to the DTE for review and approval prior to use.

REVISED PCCP MINIMUM PORTLAND CEMENT CONTENT

The Standard Specifications are revised as follows:

SECTION 501, BEGIN LINE 99, DELETE AND INSERT AS FOLLOWS:

501.05 Concrete Mix Criteria

The CMD shall produce workable concrete mixtures having the following properties:

~~Minimum portland cement content ..... 440 lbs/yd^3 (260 kg/m^3)~~

Minimum portland cement content ..... 400 lbs/yd^3 (240 kg/m^3)